

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

ANALYTICAL REPORT

Perfluorocarbon (PFC) Analysis

Lot #: D0A150558

Dena Haverland

**Dalton Utilities
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February 10, 2010

Case Narrative

D0A150558

TestAmerica Denver utilizes USEPA approved methods in all analytical work. The samples presented in this report were analyzed for the parameters listed on the methods summary page in accordance with the methods indicated. Dilution factors and footnotes are provided on each datasheet to assist in the interpretation of the results.

The results relate only to the samples in this report and meet all requirements of NELAC. All data have been reviewed for compliance with the laboratory QA/QC plan and have found to be compliant with laboratory protocols with any exceptions noted below.

Please note that Non-Detect (ND) results have been evaluated down to the Method Detection Limit (MDL) and should be considered ND at the MDL. Unless otherwise noted, results for solids have been dry weight corrected.

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Sample Arrival and Receipt

The following report contains the analytical results for four samples received at TestAmerica Denver on January 15, 2010, according to documented sample acceptance procedures. The samples were received in good condition at a temperature of 2.6°C. No anomalies were encountered during sample receipt.

Standards

Analytical standards were prepared using commercially available certified solutions containing all compounds of interest.

The mass labeled compounds 13C4 PFBA, 13C2 PFHxA, 18O2 PFHxS, 13C4 PFOA, 13C4 PFOS, 13C5 PFNA, 13C2 PFDA, 13C2 PFUnA, 13C2 PFDoA, and D3 MeFOSA were introduced at the extraction step and were used for internal standards for the quantitation of the target compounds.

Sample Extraction and Analysis

The samples presented in this report were extracted for the target analytes by TestAmerica Denver's Standard Operating Procedure (SOP) DV-OP-0019 and analyzed for the target analytes by TestAmerica Denver's SOP DV-LC-0012.

Method QC Samples

The Method Blank is processed reagent water spiked with internal standard and prepared with each batch of 20 samples of the same matrix. The method blanks were non-detect at the reporting limits for the target analytes.

Each batch is prepared with low and mid level Laboratory Control Samples (LCS). The LCS recoveries for both levels were within established control limits, with the exception of the items noted in section Analytical Comments. The low-level LCS requirement changed on January 26, 2010.

Analytical Comments

The Standard Operating Procedure (SOP) was altered slightly in the sample preparation for FOSA. Sodium hydroxide was added to all four samples to obtain a pH of >12 instead of the SOP required <2. The basic pH is generating better internal standard recoveries for MeFOSA.

Each sample is analyzed to achieve the lowest possible reporting limits within the constraints of the method. Due to matrix interference, all four samples had to be analyzed at dilutions. Please note the extracts were black, orange, or dark brown in color. The reporting limits have been adjusted relative to the dilutions required.

The organic preparation chemist had to use two cartridges to extract samples I-3, E-3, and I-4, due to the first cartridges clogging. After the second cartridges clogged, the amount of volume extracted was measured and used as the volume of the extraction constant. The surrogate concentrations were adjusted accordingly.

Due to high percent recoveries in the low-level LCS and mid-level LCS/LCSD associated with batch 0018141, all four samples were re-extracted out of the laboratory prescribed hold time and reanalyzed in QC batch 0032537. Both batches have been included in this report. There is no prescribed regulatory holding time requirement for PFCs. The scientific literature indicates PFCs are highly persistent compounds in the environment. TestAmerica Denver has conducted stability studies indicating medium- and low-level standard solutions of PFOA are stable for at least three months in glass, polystyrene, and polypropylene plastics at 4 ± 2 °C. The 7-day/40-day and 14-day/40-day holding times listed above are based on the general EPA convention for the holding time of extractable organic compounds in water and soil. Please note the sample results should be considered estimated.

The low-level LCS and mid-level LCS/LCSD associated with QC batch 0018141 exhibited percent recoveries outside the QC control limits for several compounds. This is an indicator that data may be biased high. Upon re-extraction and reanalysis in QC batch 0032537, percent recoveries were 100% in control. Both sets of data have been provided, as re-extraction was unavoidably performed outside the laboratory recommended sample holding time.

Due to a limitation in the LIM system, the PFC low-level LCS associated with QC batch 0018141 reported the percent recovery for Perfluorotridecanoic Acid (PFTriA) as 0.0%. PFTriA was recovered within the control limits (44-164%) at 80.7%. As the compound was detected below the Method Detection Limit (MDL) of 0.01772 ug/L, the system reports the percent recovery as 0.0%.

On January 26, 2010, the extraction Standard Operating Procedure (SOP) DV-OP-0019 was revised to remove the requirement for a low-level LCS. This means re-extraction batch 0032537 only has a mid-level LCS/LCSD.

The method required MS/MSD could not be performed for QC batches 0018139, 0018141, and 0032537, due to insufficient sample volume. Method precision and accuracy have been verified by the acceptable low-level LCS and/or mid-level LCS/LCSD analyses data.

The Standard Operating Procedure (SOP) was altered slightly for these samples in the sample prep and LC conditions. The alterations are listed below.

Solvents are now the same as they were in the original SOP and run per the following gradient: From 0 to 11 minutes, the flow rate is 0.4 mL/minute and the MeOH ramps up from 25% to 100%. From 11 to 11.01 minutes, the flow rate increases to 0.7 mL/minute and this flow is diverted from the MS. At 13 minutes the flow rate decreases back down to 0.4 mL/minute and 25% MeOH. The column then equilibrates to 14 minutes.

PFTriA and PFTeA now use 13C2 PFUnA as their internal standard instead of 13C2 PFDoA.

No other anomalies were observed.

EXECUTIVE SUMMARY - Detection Highlights

DOA150558

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING LIMIT</u>	<u>UNITS</u>	<u>ANALYTICAL METHOD</u>
I-3 01/11/10 12:00 001				
Perfluorohexanoic acid (PFHxA) 0.23 J	1.0	ug/L	DEN -LC-0012	
E-3 01/11/10 12:00 002				
Perfluoroheptanoic acid (PFHpA) 0.22 J	0.30	ug/L	DEN -LC-0012	
Perfluoropentanoic acid (PFPA) 1.4	0.30	ug/L	DEN -LC-0012	
Perfluorobutanoic acid (PFBA) 0.26	0.20	ug/L	DEN -LC-0012	
Perfluorohexanoic acid (PFHxA) 0.53	0.20	ug/L	DEN -LC-0012	
Perfluorobutane sulfonate (PFB) 1.6	0.20	ug/L	DEN -LC-0012	
Perfluoroctanoic Acid 0.23	0.20	ug/L	DEN -LC-0012	
Perfluoroheptanoic acid (PFHpA) 0.15 J	0.30	ug/L	DEN -LC-0012	
Perfluoropentanoic acid (PFPA) 1.4	0.30	ug/L	DEN -LC-0012	
Perfluorobutanoic acid (PFBA) 0.20	0.20	ug/L	DEN -LC-0012	
Perfluorohexanoic acid (PFHxA) 0.46	0.20	ug/L	DEN -LC-0012	
Perfluorobutane sulfonate (PFB) 1.1	0.20	ug/L	DEN -LC-0012	
Perfluoroctanoic Acid 0.18 J	0.20	ug/L	DEN -LC-0012	
I-4 01/11/10 12:00 003				
Perfluorohexanoic acid (PFHxA) 0.21 J	1.0	ug/L	DEN -LC-0012	
Perfluorobutane sulfonate (PFB) 1.9	1.0	ug/L	DEN -LC-0012	
Perfluorohexanoic acid (PFHxA) 0.20 J	1.0	ug/L	DEN -LC-0012	
Perfluorobutane sulfonate (PFB) 1.6	1.0	ug/L	DEN -LC-0012	
E-4 01/11/10 12:00 004				
Perfluoroheptanoic acid (PFHpA) 0.31	0.30	ug/L	DEN -LC-0012	
Perfluoropentanoic acid (PFPA) 1.5	0.30	ug/L	DEN -LC-0012	
Perfluorobutanoic acid (PFBA) 0.54	0.20	ug/L	DEN -LC-0012	
Perfluorohexanoic acid (PFHxA) 0.72	0.20	ug/L	DEN -LC-0012	
Perfluorodecanoic acid (PFDA) 0.095 J	0.20	ug/L	DEN -LC-0012	
Perfluorobutane sulfonate (PFB) 2.6	0.20	ug/L	DEN -LC-0012	
Perfluoroctanoic Acid 0.33	0.20	ug/L	DEN -LC-0012	
Perfluoroheptanoic acid (PFHpA) 0.26 J	0.30	ug/L	DEN -LC-0012	
Perfluoropentanoic acid (PFPA) 1.4	0.30	ug/L	DEN -LC-0012	
Perfluorobutanoic acid (PFBA) 0.47	0.20	ug/L	DEN -LC-0012	
Perfluorohexanoic acid (PFHxA) 0.58	0.20	ug/L	DEN -LC-0012	
Perfluorobutane sulfonate (PFB) 1.8	0.20	ug/L	DEN -LC-0012	
Perfluoroctanoic Acid 0.26	0.20	ug/L	DEN -LC-0012	

METHODS SUMMARY

DOA150558

<u>PARAMETER</u>	<u>ANALYTICAL METHOD</u>	<u>PREPARATION METHOD</u>
LC/MS/MS PFCs	DEN -LC-0012	SW846 FOSA spec

References:

DEN TestAmerica Laboratores, Denver, Facility Standard Operating Procedure.

METHOD / ANALYST SUMMARY

DOA150558

<u>ANALYTICAL METHOD</u>	<u>ANALYST</u>	<u>ANALYST ID</u>
DEN -LC-0012	Teresa L. Williams	002510

References:

DEN TestAmerica Laboratores, Denver, Facility Standard
Operating Procedure.

SAMPLE SUMMARY

DOA150558

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
LR9AT	001	I-3	01/11/10	12:00
LR9AV	002	E-3	01/11/10	12:00
LR9AX	003	I-4	01/11/10	12:00
LR9AO	004	E-4	01/11/10	12:00

NOTE (S) :

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

Dalton Utilities

Client Sample ID: I-3

HPLC

Lot-Sample #....: D0A150558-001 **Work Order #....:** LR9AT1AA **Matrix.....:** WATER
Date Sampled....: 01/11/10 12:00 **Date Received...:** 01/15/10
Prep Date.....: 01/18/10 **Analysis Date...:** 01/30/10
Prep Batch #....: 0018141 **Analysis Time...:** 19:27
Dilution Factor: 50

Method.....: DEN -LC-0012

PARAMETER	RESULT	REPORTING		
		LIMIT	UNITS	MDL
Perfluoroheptanoic acid (PFHpA)	ND	1.5	ug/L	0.66
Perfluorononanoic acid (PFNA)	ND	2.0	ug/L	0.87
Perfluorododecanoic acid (PFDo A)	ND	1.5	ug/L	0.75
Perfluorotridecanoic acid (PFT riA)	ND	2.0	ug/L	0.89
Perfluorotetradecanoic acid (PFTeA)	ND	1.5	ug/L	0.73
Perfluoropentanoic acid (PFPA)	ND	1.5	ug/L	0.55
Perfluorohexane sulfonate (PFH xS)	ND	1.5	ug/L	0.35
Perfluorobutanoic acid (PFBA)	ND	1.0	ug/L	0.49
Perfluorohexanoic acid (PFHxA)	ND	1.0	ug/L	0.15
Perfluorodecanoic acid (PFDA)	ND	1.0	ug/L	0.39
Perfluoroundecanoic acid (PFUn A)	ND	1.0	ug/L	0.34
Perfluorobutane sulfonate (PFB S)	ND	1.0	ug/L	0.41
Perfluorooctanesulfonate	ND	1.5	ug/L	0.67
Perfluorooctanoic Acid	ND	1.0	ug/L	0.49

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
13C4 PFOA	116	(60 - 155)
13C4 PFOS	108	(45 - 130)
13C4 PFBA	94	(36 - 130)
13C2 PFHxA	121	(55 - 135)
18O2 PFHxS	107	(61 - 130)
13C5 PFNA	127	(54 - 132)
13C2 PFDA	117	(53 - 130)
13C2 PFUnA	125	(37 - 130)
13C2 PFDoA	126	(26 - 130)

Dalton Utilities

Client Sample ID: I-3

HPLC

Lot-Sample #....: D0A150558-001 Work Order #....: LR9AT1AC Matrix.....: WATER
Date Sampled....: 01/11/10 12:00 Date Received...: 01/15/10
Prep Date.....: 01/18/10 Analysis Date...: 01/21/10
Prep Batch #....: 0018139 Analysis Time...: 11:17
Dilution Factor: 105

Method.....: DEN -LC-0012

PARAMETER	RESULT	REPORTING		
		LIMIT	UNITS	MDL
Perfluorooctane sulfonamide (F OSA)	ND	5.2	ug/L	0.60
SURROGATE	PERCENT	RECOVERY	LIMITS	
MeFOSA	109	(37 - 130)		

Dalton Utilities

Client Sample ID: I-3

HPLC

Lot-Sample #....: D0A150558-001 Work Order #....: LR9AT2AA Matrix.....: WATER
 Date Sampled....: 01/11/10 12:00 Date Received...: 01/15/10
 Prep Date.....: 02/01/10 Analysis Date...: 02/05/10
 Prep Batch #....: 0032537 Analysis Time...: 14:03
 Dilution Factor: 50

Method.....: DEN -LC-0012

PARAMETER	RESULT	REPORTING		
		LIMIT	UNITS	MDL
Perfluoroheptanoic acid (PFHpA)	ND	1.5	ug/L	0.66
Perfluorononanoic acid (PFNA)	ND	2.0	ug/L	0.87
Perfluorododecanoic acid (PFDo A)	ND	1.5	ug/L	0.75
Perfluorotridecanoic acid (PFT ria)	ND	2.0	ug/L	0.89
Perfluorotetradecanoic acid (P FTeA)	ND	1.5	ug/L	0.73
Perfluoropentanoic acid (PFPA)	ND	1.5	ug/L	0.55
Perfluorohexane sulfonate (PFH xS)	ND	1.5	ug/L	0.35
Perfluorobutanoic acid (PFBA)	ND	1.0	ug/L	0.49
Perfluorohexanoic acid (PFHxA)	0.23 J	1.0	ug/L	0.15
Perfluorodecanoic acid (PFDA)	ND	1.0	ug/L	0.39
Perfluoroundecanoic acid (PFUn A)	ND	1.0	ug/L	0.34
Perfluorobutane sulfonate (PFB S)	ND	1.0	ug/L	0.41
Perfluorooctanesulfonate	ND	1.5	ug/L	0.67
Perfluorooctanoic Acid	ND	1.0	ug/L	0.49

SURROGATE	PERCENT RECOVERY	RECOVERY	
		LIMITS	
13C4 PFOA	85	(60	- 155)
13C4 PFOS	82	(45	- 130)
13C4 PFBA	85	(36	- 130)
13C2 PFHxA	78	(55	- 135)
18O2 PFHxS	81	(61	- 130)
13C5 PFNA	90	(54	- 132)
13C2 PFDA	87	(53	- 130)
13C2 PFUnA	90	(37	- 130)
13C2 PFDoA	98	(26	- 130)

NOTE(S) :

J Estimated result. Result is less than RL.

Dalton Utilities

Client Sample ID: E-3

HPLC

Lot-Sample #....: D0A150558-002 Work Order #....: LR9AV1AA Matrix.....: WATER
 Date Sampled....: 01/11/10 12:00 Date Received...: 01/15/10
 Prep Date.....: 01/18/10 Analysis Date...: 01/30/10
 Prep Batch #....: 0018141 Analysis Time...: 19:42
 Dilution Factor: 10

Method.....: DEN -LC-0012

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Perfluoroheptanoic acid (PFHpA)	0.22 J	0.30	ug/L	0.13
Perfluorononanoic acid (PFNA)	ND	0.40	ug/L	0.17
Perfluorododecanoic acid (PFDo A)	ND	0.30	ug/L	0.15
Perfluorotridecanoic acid (PFT riA)	ND	0.40	ug/L	0.18
Perfluorotetradecanoic acid (PFTeA)	ND	0.30	ug/L	0.15
Perfluoropentanoic acid (PFPA)	1.4	0.30	ug/L	0.11
Perfluorohexane sulfonate (PFH xS)	ND	0.30	ug/L	0.070
Perfluorobutanoic acid (PFBA)	0.26	0.20	ug/L	0.098
Perfluorohexanoic acid (PFHxA)	0.53	0.20	ug/L	0.029
Perfluorodecanoic acid (PFDA)	ND	0.20	ug/L	0.078
Perfluoroundecanoic acid (PFUn A)	ND	0.20	ug/L	0.069
Perfluorobutane sulfonate (PFB S)	1.6	0.20	ug/L	0.082
Perfluorooctanesulfonate	ND	0.30	ug/L	0.13
Perfluorooctanoic Acid	0.23	0.20	ug/L	0.098

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
13C4 PFOA	93	(60 - 155)
13C4 PFOS	83	(45 - 130)
13C4 PFBA	94	(36 - 130)
13C2 PFHxA	95	(55 - 135)
18O2 PFHxS	83	(61 - 130)
13C5 PFNA	91	(54 - 132)
13C2 PFDA	85	(53 - 130)
13C2 PFUnA	94	(37 - 130)
13C2 PFDoA	93	(26 - 130)

NOTE (S) :

J Estimated result. Result is less than RL.

Dalton Utilities

Client Sample ID: E-3

HPLC

Lot-Sample #....: D0A150558-002 Work Order #....: LR9AV1AC Matrix.....: WATER
Date Sampled....: 01/11/10 12:00 Date Received...: 01/15/10
Prep Date.....: 01/18/10 Analysis Date...: 01/21/10
Prep Batch #....: 0018139 Analysis Time...: 11:22
Dilution Factor: 12.5

Method.....: DEN -LC-0012

PARAMETER	RESULT	REPORTING		
		LIMIT	UNITS	MDL
Perfluorooctane sulfonamide (F OSA)	ND	0.62	ug/L	0.071
<hr/>				
SURROGATE	PERCENT	RECOVERY		
MeFOSA	111	LIMITS	(37 - 130)	

Dalton Utilities

Client Sample ID: E-3

HPLC

Lot-Sample #....: D0A150558-002 Work Order #....: LR9AV2AA Matrix.....: WATER
 Date Sampled...: 01/11/10 12:00 Date Received...: 01/15/10
 Prep Date.....: 02/01/10 Analysis Date...: 02/02/10
 Prep Batch #....: 0032537 Analysis Time...: 23:07
 Dilution Factor: 10

Method.....: DEN -LC-0012

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Perfluoroheptanoic acid (PFHpA)	0.15 J	0.30	ug/L	0.13
Perfluorononanoic acid (PFNA)	ND	0.40	ug/L	0.17
Perfluorododecanoic acid (PFDo A)	ND	0.30	ug/L	0.15
Perfluorotridecanoic acid (PFT riA)	ND	0.40	ug/L	0.18
Perfluorotetradecanoic acid (PFTeA)	ND	0.30	ug/L	0.15
Perfluoropentanoic acid (PFPA)	1.4	0.30	ug/L	0.11
Perfluorohexane sulfonate (PFH xS)	ND	0.30	ug/L	0.070
Perfluorobutanoic acid (PFBA)	0.20	0.20	ug/L	0.098
Perfluorohexanoic acid (PFHxA)	0.46	0.20	ug/L	0.029
Perfluorodecanoic acid (PFDA)	ND	0.20	ug/L	0.078
Perfluoroundecanoic acid (PFUn A)	ND	0.20	ug/L	0.069
Perfluorobutane sulfonate (PFB S)	1.1	0.20	ug/L	0.082
Perfluorooctanesulfonate	ND	0.30	ug/L	0.13
Perfluorooctanoic Acid	0.18 J	0.20	ug/L	0.098

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
13C4 PFOA	115	(60 - 155)
13C4 PFOS	113	(45 - 130)
13C4 PFBA	114	(36 - 130)
13C2 PFHxA	101	(55 - 135)
18O2 PFHxS	109	(61 - 130)
13C5 PFNA	109	(54 - 132)
13C2 PFDA	109	(53 - 130)
13C2 PFUnA	113	(37 - 130)
13C2 PFDoA	113	(26 - 130)

NOTE(S) :

J Estimated result. Result is less than RL.

Dalton Utilities

Client Sample ID: I-4

HPLC

Lot-Sample #....: D0A150558-003 Work Order #....: LR9AX1AA Matrix.....: WATER
 Date Sampled....: 01/11/10 12:00 Date Received...: 01/15/10
 Prep Date.....: 01/18/10 Analysis Date...: 01/30/10
 Prep Batch #....: 0018141 Analysis Time...: 19:57
 Dilution Factor: 50

Method.....: DEN -LC-0012

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING LIMIT</u>	<u>UNITS</u>	<u>MDL</u>
Perfluoroheptanoic acid (PFHpA)	ND	1.5	ug/L	0.66
Perfluorononanoic acid (PFNA)	ND	2.0	ug/L	0.87
Perfluorododecanoic acid (PFDo A)	ND	1.5	ug/L	0.75
Perfluorotridecanoic acid (PFT riA)	ND	2.0	ug/L	0.89
Perfluorotetradecanoic acid (PFTeA)	ND	1.5	ug/L	0.73
Perfluoropentanoic acid (PFPA)	ND	1.5	ug/L	0.55
Perfluorohexane sulfonate (PFH xS)	ND	1.5	ug/L	0.35
Perfluorobutanoic acid (PFBA)	ND	1.0	ug/L	0.49
Perfluorohexanoic acid (PFHxA)	0.21 J	1.0	ug/L	0.15
Perfluorodecanoic acid (PFDA)	ND	1.0	ug/L	0.39
Perfluoroundecanoic acid (PFUn A)	ND	1.0	ug/L	0.34
Perfluorobutane sulfonate (PFB S)	1.9	1.0	ug/L	0.41
Perfluorooctanesulfonate	ND	1.5	ug/L	0.67
Perfluorooctanoic Acid	ND	1.0	ug/L	0.49

<u>SURROGATE</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>
13C4 PFOA	96	(60 - 155)
13C4 PFOS	91	(45 - 130)
13C4 PFBA	95	(36 - 130)
13C2 PFHxA	100	(55 - 135)
18O2 PFHxS	88	(61 - 130)
13C5 PFNA	93	(54 - 132)
13C2 PFDA	94	(53 - 130)
13C2 PFUnA	96	(37 - 130)
13C2 PFDoA	101	(26 - 130)

NOTE(S) :

J Estimated result. Result is less than RL.

Dalton Utilities

Client Sample ID: I-4

HPLC

Lot-Sample #....: D0A150558-003 Work Order #....: LR9AX1AC Matrix.....: WATER
Date Sampled....: 01/11/10 12:00 Date Received...: 01/15/10
Prep Date.....: 01/18/10 Analysis Date...: 01/21/10
Prep Batch #....: 0018139 Analysis Time...: 11:28
Dilution Factor: 125

Method.....: DEN -LC-0012

PARAMETER	RESULT	REPORTING		
		LIMIT	UNITS	MDL
Perfluorooctane sulfonamide (F OSA)	ND	6.2	ug/L	0.71
<hr/>				
SURROGATE	PERCENT	RECOVERY	LIMITS	
MeFOSA	98	(37 - 130)		

Dalton Utilities

Client Sample ID: I-4

HPLC

Lot-Sample #....: D0A150558-003 Work Order #....: LR9AX2AA Matrix.....: WATER
 Date Sampled...: 01/11/10 12:00 Date Received...: 01/15/10
 Prep Date.....: 02/01/10 Analysis Date...: 02/02/10
 Prep Batch #....: 0032537 Analysis Time...: 23:22
 Dilution Factor: 50

Method.....: DEN -LC-0012

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Perfluoroheptanoic acid (PFHpA)	ND	1.5	ug/L	0.66
)				
Perfluorononanoic acid (PFNA)	ND	2.0	ug/L	0.87
Perfluorododecanoic acid (PFDoA)	ND	1.5	ug/L	0.75
A)				
Perfluorotridecanoic acid (PFT ria)	ND	2.0	ug/L	0.89
Perfluorotetradecanoic acid (P FTeA)	ND	1.5	ug/L	0.73
Perfluoropentanoic acid (PFPA)	ND	1.5	ug/L	0.55
Perfluorohexane sulfonate (PFH xS)	ND	1.5	ug/L	0.35
Perfluorobutanoic acid (PFBA)	ND	1.0	ug/L	0.49
Perfluorohexanoic acid (PFHxA)	0.20 J	1.0	ug/L	0.15
Perfluorodecanoic acid (PFDA)	ND	1.0	ug/L	0.39
Perfluoroundecanoic acid (PFUnA)	ND	1.0	ug/L	0.34
A)				
Perfluorobutane sulfonate (PFB S)	1.6	1.0	ug/L	0.41
Perfluorooctanesulfonate	ND	1.5	ug/L	0.67
Perfluorooctanoic Acid	ND	1.0	ug/L	0.49

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
13C4 PFOA	107	(60 - 155)
13C4 PFOS	113	(45 - 130)
13C4 PFBA	108	(36 - 130)
13C2 PFHxA	97	(55 - 135)
18O2 PFHxS	106	(61 - 130)
13C5 PFNA	109	(54 - 132)
13C2 PFDA	110	(53 - 130)
13C2 PFUnA	110	(37 - 130)
13C2 PFDoA	111	(26 - 130)

NOTE(S) :

J Estimated result. Result is less than RL.

Dalton Utilities

Client Sample ID: E-4

HPLC

Lot-Sample #....: D0A150558-004 Work Order #....: LR9A01AA Matrix.....: WATER
 Date Sampled....: 01/11/10 12:00 Date Received...: 01/15/10
 Prep Date.....: 01/18/10 Analysis Date...: 01/30/10
 Prep Batch #....: 0018141 Analysis Time...: 20:12
 Dilution Factor: 10

Method.....: DEN -LC-0012

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Perfluoroheptanoic acid (PFHpA)	0.31	0.30	ug/L	0.13
)				
Perfluorononanoic acid (PFNA)	ND	0.40	ug/L	0.17
Perfluorododecanoic acid (PFDo A)	ND	0.30	ug/L	0.15
Perfluorotridecanoic acid (PFT riA)	ND	0.40	ug/L	0.18
Perfluorotetradecanoic acid (P FTeA)	ND	0.30	ug/L	0.15
Perfluoropentanoic acid (PPFA)	1.5	0.30	ug/L	0.11
Perfluorohexane sulfonate (PFH xS)	ND	0.30	ug/L	0.070
Perfluorobutanoic acid (PFBA)	0.54	0.20	ug/L	0.098
Perfluorohexanoic acid (PFHxA)	0.72	0.20	ug/L	0.029
Perfluorodecanoic acid (PFDA)	0.095 J	0.20	ug/L	0.078
Perfluoroundecanoic acid (PFUn A)	ND	0.20	ug/L	0.069
Perfluorobutane sulfonate (PFB S)	2.6	0.20	ug/L	0.082
Perfluorooctanesulfonate	ND	0.30	ug/L	0.13
Perfluorooctanoic Acid	0.33	0.20	ug/L	0.098

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
13C4 PFOA	91	(60 - 155)
13C4 PFOS	88	(45 - 130)
13C4 PFBA	99	(36 - 130)
13C2 PFHxA	99	(55 - 135)
18O2 PFHxS	83	(61 - 130)
13C5 PFNA	93	(54 - 132)
13C2 PFDA	86	(53 - 130)
13C2 PFUnA	88	(37 - 130)
13C2 PFDoA	91	(26 - 130)

NOTE (S) :

J Estimated result. Result is less than RL.

Dalton Utilities

Client Sample ID: E-4

HPLC

Lot-Sample #....: D0A150558-004 Work Order #....: LR9A01AC Matrix.....: WATER
Date Sampled....: 01/11/10 12:00 Date Received...: 01/15/10
Prep Date.....: 01/18/10 Analysis Date...: 01/21/10
Prep Batch #....: 0018139 Analysis Time...: 11:33
Dilution Factor: 10

Method.....: DEN -LC-0012

PARAMETER	RESULT	REPORTING		
		LIMIT	UNITS	MDL
Perfluorooctane sulfonamide (F OSA)	ND	0.50	ug/L	0.057

SURROGATE	PERCENT	RECOVERY	
		RECOVERY	LIMITS
MeFOSA	99	(37 - 130)	

Dalton Utilities

Client Sample ID: E-4

HPLC

Lot-Sample #....: D0A150558-004 **Work Order #....:** LR9A02AA **Matrix.....:** WATER
Date Sampled....: 01/11/10 12:00 **Date Received...:** 01/15/10
Prep Date.....: 02/01/10 **Analysis Date...:** 02/02/10
Prep Batch #....: 0032537 **Analysis Time...:** 23:37
Dilution Factor: 10

Method.....: DEN -LC-0012

PARAMETER	RESULT	REPORTING		
		LIMIT	UNITS	MDL
Perfluoroheptanoic acid (PFHpA)	0.26 J	0.30	ug/L	0.13
Perfluorononanoic acid (PFNA)	ND	0.40	ug/L	0.17
Perfluorododecanoic acid (PFDo A)	ND	0.30	ug/L	0.15
Perfluorotridecanoic acid (PFT ria)	ND	0.40	ug/L	0.18
Perfluorotetradecanoic acid (P FTeA)	ND	0.30	ug/L	0.15
Perfluoropentanoic acid (PFPA)	1.4	0.30	ug/L	0.11
Perfluorohexane sulfonate (PFH xS)	ND	0.30	ug/L	0.070
Perfluorobutanoic acid (PFBA)	0.47	0.20	ug/L	0.098
Perfluorohexanoic acid (PFHxA)	0.58	0.20	ug/L	0.029
Perfluorodecanoic acid (PFDA)	ND	0.20	ug/L	0.078
Perfluoroundecanoic acid (PFUn A)	ND	0.20	ug/L	0.069
Perfluorobutane sulfonate (PFB S)	1.8	0.20	ug/L	0.082
Perfluorooctanesulfonate	ND	0.30	ug/L	0.13
Perfluorooctanoic Acid	0.26	0.20	ug/L	0.098

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
13C4 PFOA	126	(60 - 155)
13C4 PFOS	126	(45 - 130)
13C4 PFBA	128	(36 - 130)
13C2 PFHxA	115	(55 - 135)
18O2 PFHxS	126	(61 - 130)
13C5 PFNA	124	(54 - 132)
13C2 PFDA	122	(53 - 130)
13C2 PFUnA	128	(37 - 130)
13C2 PFDoA	125	(26 - 130)

NOTE (S) :

J Estimated result. Result is less than RL.

QC DATA ASSOCIATION SUMMARY

DOA150558

Sample Preparation and Analysis Control Numbers

<u>SAMPLE#</u>	<u>MATRIX</u>	<u>ANALYTICAL METHOD</u>	<u>LEACH BATCH #</u>	<u>PREP BATCH #</u>	<u>MS RUN#</u>
001	WATER	DEN -LC-0012		0018139	
	WATER	DEN -LC-0012		0018141	
	WATER	DEN -LC-0012		0032537	
002	WATER	DEN -LC-0012		0018139	
	WATER	DEN -LC-0012		0018141	
	WATER	DEN -LC-0012		0032537	
003	WATER	DEN -LC-0012		0018139	
	WATER	DEN -LC-0012		0018141	
	WATER	DEN -LC-0012		0032537	
004	WATER	DEN -LC-0012		0018139	
	WATER	DEN -LC-0012		0018141	
	WATER	DEN -LC-0012		0032537	